

REMARKS

Reconsideration of the above-identified application is respectfully requested.

In the Office Action of January 12, 2005, which has been made FINAL, the Examiner rejected Claims 1-3, 5-8, 12-17, 19-21 and 26 under 35 U.S.C. §103(a), as being allegedly unpatentable over Oami et al. (US 6,415,0410 ("Oami") in view of Ogawa et al. (U.S. Patent No. 6,704,431) (hereinafter "Ogawa"). Further in the Office Action, the Examiner rejected Claims 4 and 18 as allegedly unpatentable over Oami and Ogawa, in further view of Zhao (U.S. Patent No. 6,141,753) (hereinafter "Zhao") and further rejected Claims 9 and 22-23 under 35 U.S.C. §103(a) as being allegedly unpatentable over Oami and Ogawa and further in view of Kita et al (U.S. Patent No. 6,707,927) (hereinafter "Kita"). Claims 11 and 25 were further rejected as being allegedly unpatentable over Oami and Ogawa in further view of Oami (U.S. Patent No. 6,697,499).

This AMENDMENT UNDER 37 CFR §1.116 is filed in reply to the outstanding Office Action of January 12, 2005, in order to clearly and definitively set forth the invention. Applicants respectfully submit that the present amendment is being entered for clarification purposes to render all independent Claims more clear and definite. While entry thereof is not a matter of right, applicants submit that the present amendment is being submitted in response to the Examiner's rejection, as articulated in his response to arguments in ¶¶ 2 and 3 in the present Office Action that certain arguments the applicants made in distinguishing over the prior art had no corresponding claim limitations recited. Thus, this amendment could not have been earlier presented and entry and consideration of this amendment is respectfully requested.

That is, in respect to the Examiner's statements in the response to arguments section, applicants amend the claims to supplement and bolster the arguments presented in applicants prior response. Particularly, applicants amend Claim 1 (also representative of Claims 13 and 15) to set forth definitively a data processing apparatus for selecting one of a plurality of candidate data corresponding to watermark data embedded into object data to embed the selected one candidate data as said watermark data without prior categorization of data to be embedded with said watermark data. Furthermore, Claim 1, 13 and 15 further sets forth elements including:

object processing apparatus for dividing input data into a plurality of object blocks distributed in a spatial domain, each object block comprising an array of pixels, and using the object blocks as said object data for embedding;

a variation indication data generation means for generating a plurality of variation indication data indicating variation between said object data and each of the object data obtained by embedding each of said plurality of candidate data, each of said plurality of candidate data comprised of a different block pattern having pixel element values adjusted from a selected basic pattern associated with an individual object block and having a same structure as said object block;

a detectability indication data generation means for generating a plurality of detectability indication data, each indicating the detectability of each of said plurality of candidate data;

a watermark data selection means for selecting one of said candidate data based on said plurality of variation indication data and said plurality of detectability indication data; and

a data embedding means for embedding the selected candidate data into said object data as said watermark data, wherein said embedding is performed in said spatial domain.

With respect to the rejection of Claim 1 as allegedly obvious in view of the combination of Oami and Ogawa, applicants respectfully disagree as follows:

1) In a first respect: the present invention in Claim 1 is directed to a data processing apparatus for selecting one of a plurality of candidate data corresponding to watermark data embedded into object data to embed the selected one candidate data as said watermark data without prior categorization of data to be embedded with said watermark data. This, by itself distinguishes over Oami which requires that the entire image which is to be embedded with a watermark be first categorized in order to expedite subsequent process steps. As previously argued, the present invention does not categorize an input image. Instead, the invention processes an input image block wise (see FIG.6) and calculates the affect of embedding a selected pattern corresponding to each block through a "variation indication data generation means". This is a more general and practical solution than categorizing an input image into a predefined range.

2) In a second respect: the present invention in Claim 1 includes an object processing apparatus for dividing input data into a plurality of object blocks distributed in a spatial domain, each object block comprising an array of pixels. This is clearly shown in Figures 4(a) and 4(b). Further, each of the object blocks are used as the object data for embedding. Furthermore, Claim 1 has been amended to set forth that (prior to its selection) each of the plurality of candidate data is comprised of a different block pattern having pixel element values adjusted from a selected basic pattern associated with an individual object

block and having a same structure as said object block. This is clearly supported in the specification, for example, in the substituted specification page 5, paragraphs [0015 and 00114] , and further in the description supporting Figures 3, 7 and 8. That is, the basic adjustment pattern unit 26 (Figure 3) generates a plurality of adjusted basic patterns ($P'_{hij1}, \dots, P'_{hijn}$) (Figure 7) based on a selected, previously determined pattern type (P_{hij}) selected in accordance with a key and the watermark data and corresponding to one object block. The watermark pattern generator element 28 (Figure 3) selects the one candidate data (a pattern P'_{ij}), i.e., an adjusted block pattern having a same structure as the object block and having element values therein adjusted from a selected basic pattern. Notably, the candidate generation means generates the plurality of candidate patterns, each having the same configuration a divided input image block – the configuration representing that a pixel value of a candidate pattern has the same significance of a pixel value of the original image.

While the Examiner, in his rejection, indicates that Ogawa allegedly embeds watermark data in a plurality of blocks created from the input digital data contents, applicant respectfully submits that Ogawa's embedding process is not the same. Looking to the specific teaching of Ogawa, while blocks are generated, the actual embedding is performed in the frequency domain. That is, in Ogawa, once the image blocks are obtained they are processed to generate a frequency coefficient matrix (Ogawa, Fig. 2, step 115) and from there, based on key data, generates a frequency coefficient sequence to be watermarked. The digital watermark data to be embedded in the meantime is processed to obtain a digital watermark sequence (Ogawa, Fig. 2, step 145) and it is this sequence that is embedded into the frequency coefficient sequence to generate a watermarked frequency coefficient sequence (Ogawa, Fig. 2, steps 150, 155). An inverse-orthogonal transform watermarked frequency coefficient

matrix is then applied to the watermarked frequency coefficient sequence to generate the watermarked block data. Thus, it is readily seen in Ogawa, that the actual "watermark embedding" is performed in the frequency domain with no prior adjustments of element values contained in candidate data (blocks) that are based on a selected basic pattern derived according to key and watermark data that is to be embedded in corresponding objects blocks from the original image. To the contrary, in the present invention, the embedding is performed in the spatial domain whereby a selected candidate block comprising an adjusted block pattern having a same structure as the object block and achieving both variation indication and detectability criteria is added to the specific data block on an element by element basis (as described in the substitute specification, page 34, paragraph [00144] and shown in Figure 3) in a pixel or spatial domain. Thus, the patterns of the present invention are block based with each block pattern is originated from a basic pattern.

3) In a third respect: the present invention in Claim 1 includes a data embedding means for embedding the selected candidate data into said object data as said watermark data, wherein said embedding is performed in said spatial domain. Thus, in distinction from both Oami and Ogawa whether taken alone or in combination, the embedding is performed in the spatial domain, i.e., the pattern embedding unit 204 in Figure 3 adds the candidate pattern i.e., pattern P'_{ij} to its corresponding image or object data block I'_{ij} in the pixel or spatial domain.

Respectfully these added limitations have been argued in applicants prior response, however, the Examiner noted, the claims did not support the distinguishing features that were argued. This amendment seeks to correct this by providing those limitations and reiterating the arguments already submitted by the applicants.

With respect to the rejection of Claim 2 (also representative of Claims 14 and 16) applicants note that Claim 2 is similar to Claim 1 however, specifically sets forth that the data to be embedded with a watermark data is image data. Thus, Claim 2, 14 and 16 as now amended, is directed to an image processing apparatus for selecting one of a plurality of candidate data corresponding to watermark data embedded into image data to embed the selected candidate data into said image data as said watermark data without prior categorization of said image data. Claim 2 further sets forth elements including:

image processing apparatus for dividing input data into a plurality of object blocks, each object block spatially distributed throughout an image and comprising an array of pixels, and using the object blocks as said image data for embedding;

a variation indication data generation means for generating a plurality of variation indication data indicating variation between said image data and each of the image data obtained by embedding each of said plurality of candidate data, each of said plurality of candidate data comprised of a different block pattern having pixel element values adjusted from a selected basic pattern associated with an individual object block and having a same structure as said object block;

a detectability indication data generation means for generating detectability indication data, each indicating the detectability of each of zero or more candidate data;

a candidate data selection means, for employing said detectability indication data to select one of said candidate data that corresponds to variation indication data for variations that are smaller than a predetermined reference; and

a data embedding means for embedding the selected candidate data as said watermark data in said image data, wherein said embedding is performed in a spatial domain.

Respectfully, the same arguments in support of the patentability of Claim 1 is submitted to distinguish Claim 2 over the cited combination of Oami and Ogawa: namely,

- 1) the embedding of watermark data into image data to embed selected candidate data into said image data as said watermark data without prior categorization of said image data;
- 2) the generating of object blocks each spatially distributed throughout an image (Figures 4(a) and 4(b)) and comprising an array of pixels, and using the object blocks as said image data for embedding, wherein each of the plurality of candidate data is comprised of an adjusted block pattern having a same structure as the object block; and,
- 3) the embedding of a selected candidate data that achieves both variation indication and detectability criteria is performed in a spatial domain.

In sum, the distinctions of the present invention over the combination of Oami and Ogawa are now expressly claimed in each of independent Claims 1, 2, 13, 14, 15 and 16 and are fully supported by the specification. In view of the foregoing, the Examiner is respectfully requested to withdraw the rejections of independent Claims 1, 2, 13, 14, 15 and 16 under the various rejections under 35 U.S.C. §103(a). Accordingly, the Examiner is respectfully requested to withdraw the rejection of all claims dependent thereon.

In view of the foregoing remarks herein, it is respectfully submitted that this application is in condition for allowance. Accordingly, it is respectfully requested that this application be allowed and a Notice of Allowance be issued. If the Examiner believes that a telephone conference with the Applicants' attorneys would be advantageous to the disposition

of this case, the Examiner is requested to telephone the undersigned, Applicants' attorney, at the following telephone number: (516) 742-4343.

Respectfully submitted,



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